

Notes on the biology of *Seleucus cuneiformis* Holmgren (Hymenoptera, Ichneumonidae, Ctenopelmatinae)

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Abstract

The biology of the monotypic genus *Seleucus* Holmgren, 1860 (Ichneumonidae: Ctenopelmatinae) is reported for the first time. *Seleucus cuneiformis* Holmgren, 1860, was reared from *Blasticotoma filiceti* Klug, 1834 (Hymenoptera: Blasticotomidae). *Seleucus cuneiformis* Holmgren is new to the fauna of Austria.

Keywords

Seleucus, *Blasticotoma*, biology, distribution

Introduction

The second author reared for the first time a species of Ichneumonidae from the fern sawfly *Blasticotoma filiceti* Klug, 1834 (Tenthredinoidea: Blasticotomidae) in Austria. Blasticotomidae form a small and rarely collected family of small wasps (6–9 mm) mainly restricted to the Palearctic region and the border with the Oriental region (Taeger et al. 2010), with only one European species, *Blasticotoma filiceti* Klug, 1834. The family is considered to be one of the oldest extant families of Tenthredinoidea (Rasnitsyn 1988, 2002) and the blasticotomid lineage probably separated from the rest of Tenthredinoidea as early as 280 Ma (Ronquist et al. 2012). *Blasticotoma filiceti* Klug occurs both in the West and East Palearctic regions (including the mountains of Taiwan). In Europe it is known from Austria, Denmark, England, Finland, Germany, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Sweden, Ukraine, Wales, the European part of Rus-

sia, the Altai mountains and the Baikal region (Shcherbakov 2006, Knight and Howe 2006, Liston 2007, Bowdrey 2009, Prpic 2011). *Blasticotoma filiceti* has been known for the fauna of Austria from near Linz since 1973 (Schedl 1973) and the second find is reported here from the Austrian part of the Böhmerwald. The larvae of *B. filiceti* live in the stems of ferns (especially of *Athyrium filix-femina* Roth) in a small chamber (or gall) and feed on the phloem fluids (“phloem-miner”; Shcherbakov 2006) and may produce foam on the outside of the gall. The larvae have a true ant trophobiosis (the only one known within the Hymenoptera); the *Myrmica* ants receive fluids through some holes connected to the stem gall of the larva (Shcherbakov 2006). The adult sawflies are only active in rainy weather in Europe during a short period (Liston 2007). If the ant trophobiosis is obligatory for the development of the sawfly larva it may limit the suitable places with *Athyrium* ferns and, connected with a short activity period of the adults at the end of May, it may explain why in Europe this family is probably very local.

The parasitoids reared by the second author belong to the aberrant genus *Seleucus* Holmgren, 1860. Townes (1971) classified *Seleucus* in the subfamily Phrudinae and Kolarov (1987) transferred it to the tribe Mesoleiini of the subfamily Ctenopelmatinae. Finally, Vikberg and Koponen (2000) transferred *Seleucus* to its own tribe, Seleucini, of the subfamily Ctenopelmatinae. The genus fits well in the subfamily Ctenopelmatinae according to a molecular phylogeny (Quicke et al. 2009) and its biology; nearly all Ctenopelmatinae (as far as is known) are endoparasitoids of Symphyta (Vikberg and Koponen 2000) and also some other genera of Ctenopelmatinae have the metasoma of the female compressed apically (e.g. *Saotis* Foerster, 1868). According to Quicke et al. (2009) *Seleucus* is sister group to the tribe Euryproctini of the Ctenopelmatinae. *Seleucus cuneiformis* Holmgren, 1860, is known from only a few countries in Europe (see below) and is new to the fauna of Austria. The second species included in *Seleucus* was *S. ex-areolatus* Strobl, 1904, from Austria (Yu et al. 2012), but this species was excluded from *Seleucus* by Vikberg and Koponen (2000). Later it was synonymized with *Microleptes rectangulus* (Thomson, 1888) by Horstmann (2011) and belongs to the subfamily Microleptinae Townes, 1958. *Shawiana foveolator* (Thomson, 1895) (Braconidae: Exothecinae) and *Tetrastichus rasnitsyni* Kostjukov, 2001 (Eulophidae) are known parasitoids of *Blasticotoma filiceti* (Shcherbakov 2006) but have not so far been reared in Austria.

Material and methods

The larvae of *Blasticotoma filiceti* Klug were found in early August 2011 and 2012 in the Austrian part of the Böhmerwald (an area with mountain spruce forest on the border of Austria, Czech Republic and Slovakia with Plöckenstein (1378 m) as its highest point). Many spruce trees (*Picea abies* L.) died through storms and bark beetle infestation and all were removed in the Austrian part. The resulting open area was occupied by grass (*Dechampsia* sp.), *Rubus idaeus* L., *Vaccinium myrtillus* L. and some patches of a fern (*Athyrium* sp.; Fig. 1) with the central fronds damaged. The complete infested fronds of the fern were collected in a large plastic bag and stored vertically. Twice per

day the larvae emerging from the stems of the fern leaves were removed and put into large glass jars half filled with fine earth covered with some pieces of old decaying wood or old stems of *Verbascum* sp. Some *Sphagnum* was added to maintain a higher and constant humidity in the jars. Jars with larvae or pupae were overwintered in a cellar in the second author's garden in Gross Gerungs.

For identification of *Seleucus* Holmgren, see Townes (1971) and Vikberg and Koponen (2000). For references see Yu et al. (2012). The specimens are deposited in the Naturalis Biodiversity Center (RMNH) at Leiden and the Altenhofer collection (AC) at Gross Gerungs.

Biology

The *Blasticotoma* larvae were tunnelling in the stem (or rhachis) of the fern fronds, without causing external galls. The reported foam bubble (Shcherbakov 2006, Knight and Howe 2006) and faeces emerging from the hole in the stem are rarely seen (Fig. 2), probably it is consumed or destroyed by the observed visiting ants (*Formica* sp.), parasitoids (Ichneumonidae), flies (?Tachinidae), yellow jackets (*Vespula* sp.) and ladybird beetles (*Coccinella septempunctata* L.). The full-grown larvae of *Blasticotoma filiceti* Klug bore in decaying wood or in *Verbascum*-stems for pupation; they do not make a cocoon and need protection of a fairly solid medium in the absence of a cocoon. No adults, of either sawflies nor parasitoids, emerged from jars lacking wood or stems on top of the substrate. Adults of *Blasticotoma filiceti* emerged in May 2012 over a period of about two weeks and the females readily accepted fresh (still rolled-up) *Athyrium* fronds for oviposition (Fig. 3), but other ferns present in the garden were not accepted. Four weeks later the adults of *Seleucus cuneiformis* appeared over a period of two weeks. The specimens were kept alive for a few days, before they were killed for identification. The parasitoid females at first had a droplet-shaped metasoma like the males (Fig. 5), but during the first day the metasoma expanded into the very elongate shape typical of females (Fig. 4).

Seleucus cuneiformis Holmgren, 1860

http://species-id.net/wiki/Seleucus_cuneiformis

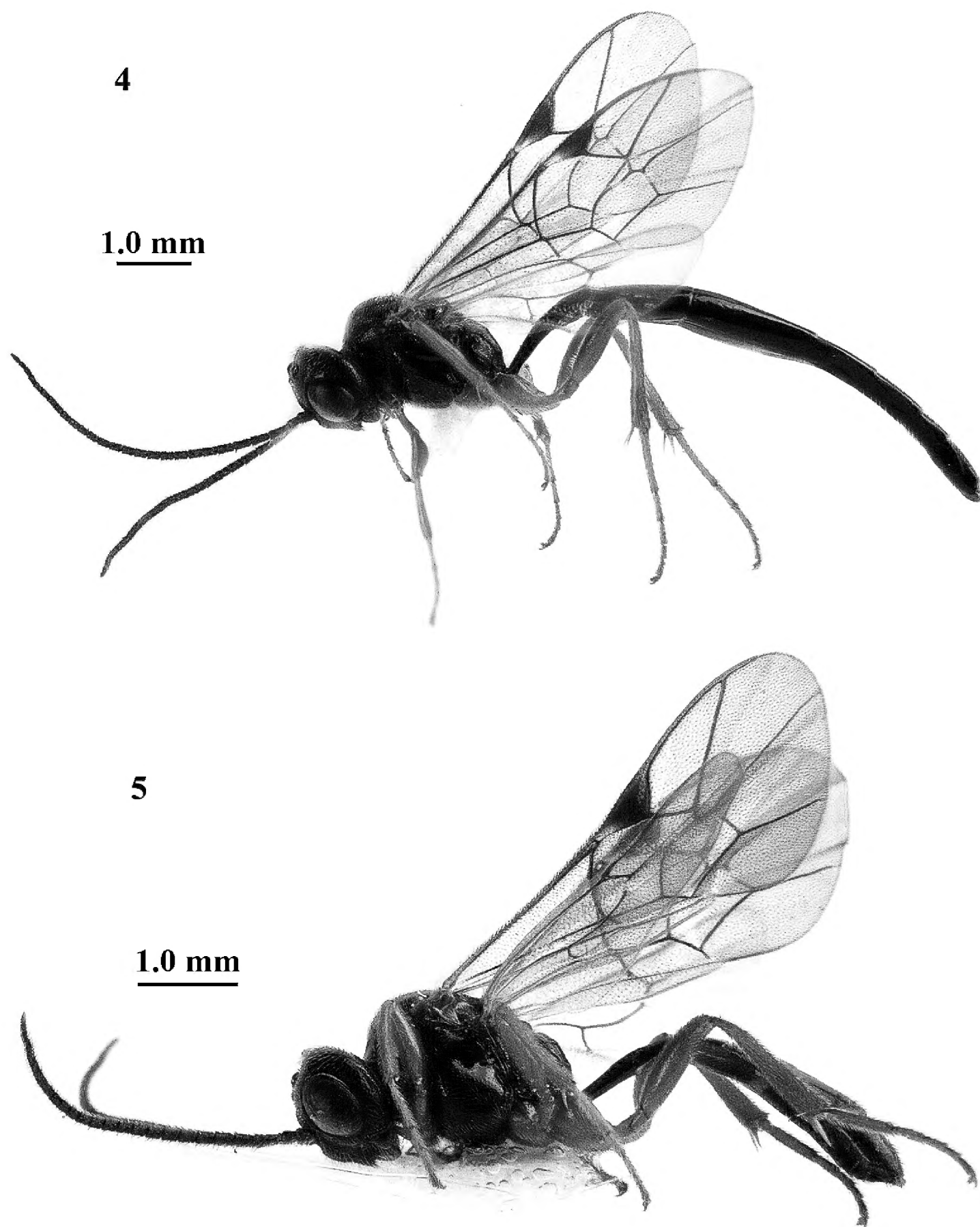
Figs 6–14

Material. 2 ♀ + 2 ♂ (RMNH) & 3 ♀ + 2 ♂ (AC), “Austria: Böhmerwald, Plöckenstein, 1200-1300 m, ex *Blasticotoma filiceti* on cf. *Athyrium* sp., coll[ected] 8.viii.2011, em[erged] 16 (1 ♂), 20 (1 ♀ + 1 ♂), 22 (1 ♂), 23 (2 ♀), 26 (1 ♀ + 1 ♂).vi.2012 & 1.vii.2012 (1 ♀), E. Altenhofer”.

Biology. Parasitoid of larvae of *Blasticotoma filiceti* Klug, 1834 (Tenthredinoidea: Blasticotomidae). The sex ratio is nearly balanced as far as the low numbers allow a conclusion. Only one male appeared before the females emerged; the others emerged together with the females.



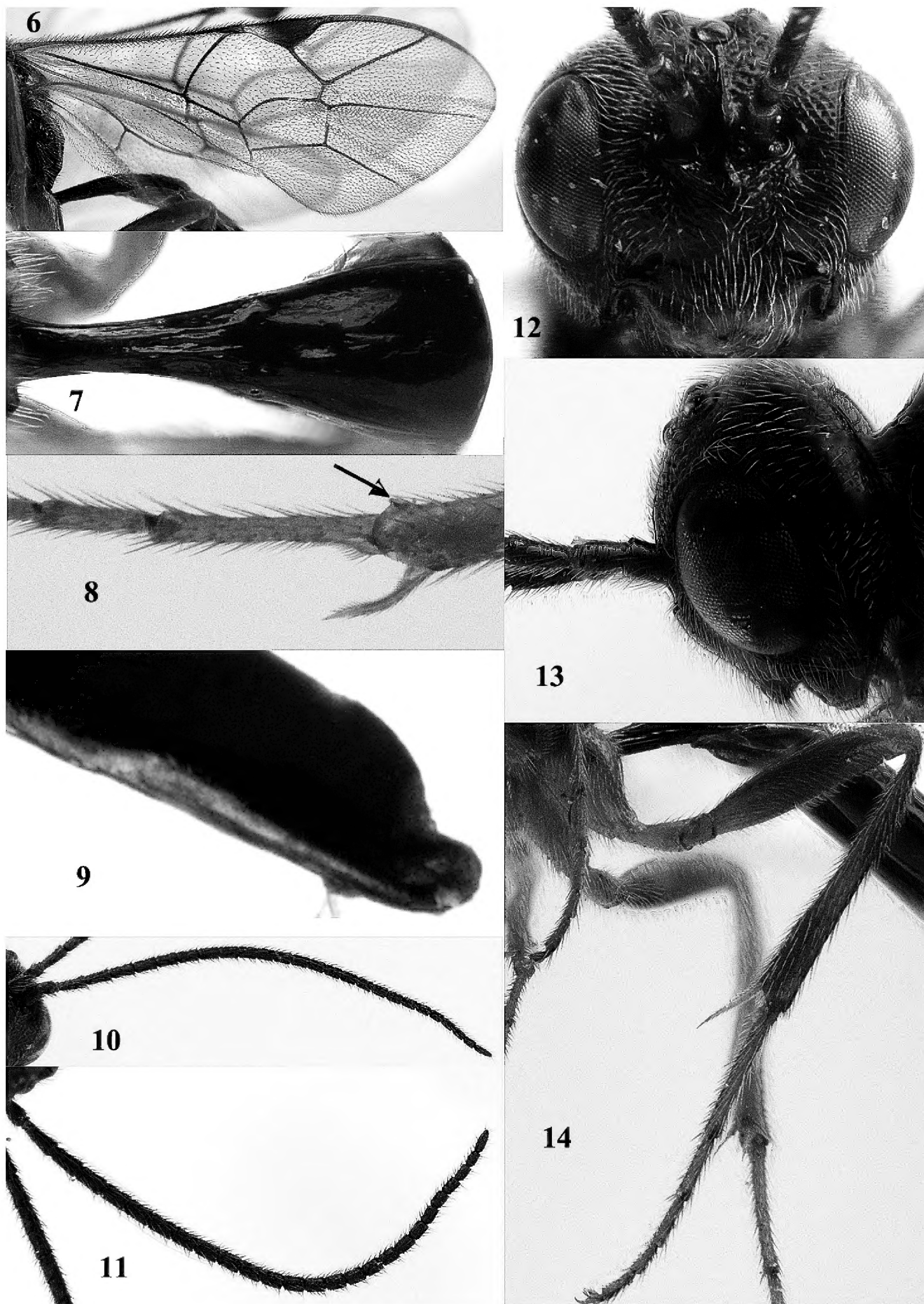
Figures 1–3. *Blasticotoma filiceti* Klug, ♀, Austria, Plöckenstein, 1.viii.2012, but 3 15.v.2012. **1** Central fronds of *Athyrium* sp. damaged by larvae tunnelling in the stems **2** foam bubble produced by tunnelling larva **3** oviposition in unfolded fern frond. Photos: E. Altenhofer.



Figures 4–5. *Seleucus cuneiformis* Holmgren, habitus lateral ♀ (4) and ♀ (5), Austria, Plöckenstein.

Distribution. Palaearctic China (Henan), Czech Republic; Finland; Germany; Japan (Hokkaido); Korea; Poland; NW European Russia; Far East Russia; Sweden (Vikberg and Koponen 2000; Yu et al. 2012) and now Austria.

Notes. The apex of the fore tibia has a more or less angulate lamella (Fig. 8, not a tooth as is supposed to be present in Ctenopelmatinae); the ovipositor sheath points upwards compared to the hypopygium (Fig. 9); the ovipositor has a dorsal notch (Vik-



Figures 6–14. *Seleucus cuneiformis* Holmgren, ♀ (except 11 = ♀), Austria, Plöckenstein. **6** Wings **7** first metasomal tergite dorsal **8** apex of fore tibia (arrow to angulate part of apical lamella) **9** ovipositor sheath lateral **10**, **11** antenna **12** head frontal **13** head lateral **14** hind leg lateral.

berg and Koponen, 2000; which excludes it from the Phrudinae and corroborates its inclusion in the Ctenopelmatinae); the first metasomal tergite has a long petiole and the spiracles are halfway along the notum (Fig. 7); the pterostigma is triangular with vein r emerging medially (Fig. 6); the frons is coarsely punctate (Fig. 12); the metasoma of the female is 3.0–3.5 times longer than the mesosoma (Fig. 4); below the clypeus is a distinct space because the clypeus is distinctly removed from the mandibles (Figs 12, 13); the clypeus has an apical fringe of bristles (Fig. 13); and the hind tarsus is very slender (Fig. 14).

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